IS 8783-4-1 (1995): Winding Wires for Submersible Motors, Part 4: Individual Wires, Section 1: HR PVC Insulated Wires [ETD 33: Winding Wire]

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भारतीय मानक

निमज्जन मोटरों के वांइडिंग तार — विशिष्टि

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अनुभाग 1 एच आर पीवीसी रोधित तार

(पहला पुनरीक्षण)

Indian Standard

WINDING WIRES FOR SUBMERSIBLE MOTORS — SPECIFICATION

PART 4 SPECIFICATION FOR INDIVIDUAL WIRES

Section 1 HR PVC Insulated Wires

(First Revision)

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BUREAU OF INDIAN STANDARDS
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NEW DELHI 110002

May 1995

Price Group 2

FOREWORD

This Indian Standard (Part 4/Sec 1) (First Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Winding Wires Sectional Committee had been approved by the Electrotechnical Division Council.

This standard was originally published in 1978 covering PVC insulated winding wires for submersible motors for 85°C operation. Two other standards on winding wires for submersible motors, namely IS 10051 : 1981 'Specification for PVC insulated winding wires for submersible motors for 105°C operation' and IS 12788 : 1989 'Specification for PVC insulated winding wires overcoated with nylon for submersible motors' have also been in vogue.

In the recent past there has been demand from the industry to make comprehensive revision of the existing standards on winding wires for submersible motors and also to include other types of insulation which are being extensively used in manufacture of winding wires for submersible motors. In view of this the new series of winding wire standards for submersible motors is being brought out as follows:

Part 1	Conductor data
Part 2	Materials for dielectric and jacket
Part 3	Methods of tests
Part 4	Specification for individual wires :
Section 1	HR PVC insulated winding wires
Section 2	Cross linked polyethylene insulated and polyamide jacketed wires
Section 3	Polyester and polypropylene insulated wires

With the publication of these standards the requirements of PVC insulated wires will be covered in Part 4, Section 1 of this series, and two new types of insulation, namely, XLPE insulated and polyester and polypropylene insulated wires have also been covered in this series. The old standards will be withdrawn in due course.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as the of the specified value in this standard.

Indian Standard

WINDING WIRES FOR SUBMERSIBLE MOTORS — SPECIFICATION

PART 4 SPECIFICATION FOR INDIVIDUAL WIRES

Section 1 HR PVC Insulated Wires

(First Revision)

1 SCOPE

1.1 This standard (Part 4/Sec 1) covers the requirements of high conductivity annealed round and stranded copper conductor PVC insulated winding wires for submersible motors.

1.2 The wires covered in this standard are suitable for use where the combination of ambient temperature and temperature rise due to load results in conductor temperature not exceeding 85°C.

2 REFERENCES

The following Indian Standards are necessary adjuncts to this standard:

IS No.	*Title*
482 : 1981	Reels for covered round electrical winding wires (*third revision*)
1885 (Part 32) : 1993	Electrotechnical vocabulary : Part 32 Electric cables (*first revision*)
4905 : 1968	Methods for random sampling
8783	Winding wires for submersible motors:
(Part 1) : 1995	Part 1 Conductor data
(Part 2) : 1995	Part 2 Materials for dielectric and jacket
(Part 3) : 1995	Part 3 Methods of tests

3 GENERAL

Compliance to IS 8783 (Part 1), IS 8783 (Part 2) and IS 8783 (Part 3) which are integral part of this standard is essential.

3.1 Conductors for this type of wires shall conform to IS 8783 (Part 1) : 1995.

3.2 Dielectric material shall conform to Type 1 of IS 8783 (Part 2) : 1995.

4 REQUIREMENTS

4.1 Thickness of Insulation

The minimum thickness of insulation shall not be less than the minimum value (t_i) specified in Tables 1 and/or 2.

4.2 Application of Insulation

The insulation shall be so applied that it fits closely on the conductor and it shall be possible to remove it without damage to the conductor.

4.3 Colour

The colour of insulation of winding wire shall be natural.

4.4 Overall Diameter

The overall diameter of winding wire shall not exceed the maximum value specified in Tables 1 and 2.

4.5 The overall surface of finished winding wire shall be reasonably smooth.

4.6 High Voltage Test (Water Immersion Test)

The wire shall withstand the test at room temperature when ac voltage of 3 kV at frequency 50 Hz is applied for one minute after immersion of the wire for minimum 12 hours in water.

5 PACKING

The winding wire shall either be wound on spools/reels conforming to IS 482 : 1981.

6 MARKING

The winding wire shall carry following information marked on the label on spool/reel:

a) Reference to this Indian Standard for example IS 8783 (Part 4/Sec 1);

b) Manufacturer's name, brand name or trade-mark;
c) Size of conductor/maximum overall diameter, area, number of strands as applicable;
d) Length of conductor on spool/reel;
e) Number of lengths on spool/reel (if more than one);
f) Approximate gross mass;
g) Country of manufacture; and
h) Year of manufacture.

Table 1 Insulation Thickness and Overall Diameter of Wires with Round Solid Conductor
(*Clauses* 4.1 *and* 4.4)

Conductor Cross-Sectional Area, Nominal	Coductor Diameter, Nominal	Thickness of Insulation (t_1), Minimum	Overall Diameter, Maximum
mm^2	mm	mm	mm
(1)	(2)	(3)	(4)
0.125	0.40	0.25	1.05
0.159	0.45	0.25	1.10
0.196	0.50	0.25	1.15
0.238	0.55	0.25	1.20
0.283	0.60	0.25	1.25
0.332	0.65	0.30	1.35
0.385	0.70	0.30	1.45
0.442	0.75	0.30	1.50
0.502	0.80	0.30	1.55
0.568	0.85	0.30	1.60
0.638	0.90	0.30	1.65
0.709	0.95	0.30	1.70
0.785	1.0	0.30	1.75
0.850	1.1	0.30	1.85
1.13	1.2	0.30	1.95
1.33	1.3	0.30	2.05
1.54	1.4	0.35	2.25
1.77	1.5	0.35	2.35
2.01	1.6	0.35	2.45
2.27	1.7	0.35	2.55
2.54	1.8	0.35	2.70
2.84	1.9	0.35	2.80
3.14	2.0	0.45	3.10
3.46	2.1	0.45	3.20
3.80	2.2	0.45	3.30
4.15	2.3	0.45	3.40
4.52	2.4	0.50	3.60
4.91	2.5	0.50	3.70
5.31	2.6	0.50	3.80
5.73	2.7	0.50	3.90
6.19	2.8	0.55	4.10
6.61	2.9	0.55	4.20
7.07	3.0	0.55	4.30
7.55	3.1	0.70	4.70
8.04	3.2	0.70	4.80
8.55	3.3	0.70	4.90
9.08	3.4	0.75	5.10
9.62	3.5	0.75	5.20
10.18	3.6	0.75	5.30
10.75	3.7	0.75	5.40
11.34	3.8	0.75	5.50
11.95	3.9	0.90	5.90
12.57	4.0	0.90	6.00
13.20	4.1	0.90	6.10
15.85	4.2	0.90	6.20
15.21	4.4	0.95	6.50
16.62	4.6	0.95	6.70
18.10	4.8	0.95	6.90
19.64	5.0	0.95	7.10

Table 2 Insulation Thickness and Overall Diameter of Wires with Stranded Conductor
(*Clauses* 4.1 *and* 4.4)

Conductor Cross-Sectional Area, Nominal	Conductor Composition No. of Wires/ Wire Diameter, Nominal	Conductor Diameter, Nominal	Thickness of Insulation (t_i), Minimum	Overall Diameter, Maximum
mm^2	No. mm	mm	mm	mm
(1)	(2)	(3)	(4)	(5)
3.58	19/0.49	2.45	0.45	3.50
4.03	19/0.52	2.60	0.45	3.60
4.50	19/0.55	2.75	0.45	3.80
5.00	19/0.58	2.90	0.45	3.90
5.55	19/0.61	3.05	0.50	4.10
6.11	19/0.64	3.20	0.50	4.30
6.90	19/0.68	3.40	0.50	4.60
7.95	19/0.73	3.65	0.50	4.90
9.08	19/0.78	3.90	0.70	5.20
10.00	19/0.82	4.10	0.70	5.40
12.09	19/0.90	4.50	0.70	5.90
13.18	19/0.94	4.70	0.70	6.10
14.00	19/0.97	4.85	0.70	6.40
14.92	19/1.00	5.00	0.70	6.60
16.00	19/1.04	5.20	0.80	6.90
18.06	19/1.10	5.50	0.80	7.20
20.08	19/1.16	5.80	0.80	7.50
21.30	27/1.00	6.15	0.80	7.80
25.50	27/1.10	6.80	0.80	8.50

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Amendments are issued to standards as the need arises on the basis of comments. Standards are also reviewed periodically; a standard along with amendments is reaffirmed when such review indicates that no changes are needed; if the review indicates that changes are needed, it is taken up for revision. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition by referring to the latest issue of 'BIS Handbook' and 'Standards: Monthly Additions'.

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Amendments Issued Since Publication

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TO
IS 8783 (PART 4/SEC 1) : 1995 WINDING WIRES FOR SUBMERSIBLE MOTORS — SPECIFICATION

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(*Page* 1, *clause* 5) — Substitute 'spools/reels/coils' *for* 'spools/reels'.

[*Page* 2, *clause* 6, *Sl No.* (d)] — Substitute the following for the existing:

'd) Length of conductor on spool/reel/coil.'

[*Page* 2, *clause* 6, *Sl No.* (e)] — Substitute the following for the existing:

'e) Number of lengths on spool/reel/coil (if more than one).

(*Page* 3, *Table* 2, *col* 2, *unit*) — Substitute 'No./mm' *for* 'No. mm'.

(*Page* 3, *Table* 2, col 4) — Substitute '0.60' *for* '0.70' as the minimum thickness of insulation for the conductors of nominal cross sectional area 9.08, 10.00, 12.09 and 13.18.

(*Page* 3, *Table* 2, *col* 5) — Substitute '7.90' *for* '7.80' and '8.60' *for* '8.50' for the values of overall diameter, maximum, corresponding to nominal cross sectional area of conductors 21.30 and 25.50.

(ETD 33)

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